REMARKS/ARGUMENTS

Claims 1-3 and 14-16 are active. Withdrawn claims 5 and 6 have been merged into claim 5 and claim 6 cancelled to reduce claim fees. Claims 4-13 were withdrawn from consideration (new claim 15 depends from claim 8). Claim 1 has been amended to refer to the temperature range of 100 to 250 degrees C which is disclosed on page 6, line 16 of the specification and at paragraph [0010] in the published application. Claim 1 has been revised to include limitations of claim 2, except that the value "0.01 percent by mass" in claim 2 has been changed to "0.1 percent by mass". Support for the range of 0.1 to 0.7 percent by mass in claim 1 is found on page 5, lines 16-17 and in Example A103 in Table AA4 on page 49 of the specification as well as in paragraph [0083] of the published application. Claim 2 as amended finds support on page 9, lines 5-6 of the specification and paragraph [085] of the published application which describe an amount of antimony less than or equal to 1 ppm. Withdrawn claim 8 has been revised for consistency with claim 1 and recites the same bismuth content range and a temperature range 100-250 degrees C. Support for zinc content in claims 8 and 10 is found in the middle of page 9 of the specification. New claims 14-15 find support in the description of the O/I ratio on page 24 of the specification or in paragraph [0093] of the published application. Claim 16 tracks claim 1, except that it does not contain the phrase "to which indium is not added" and includes the O/I ration described on page 24 of the specification. No new matter is believed to have been added. Favorable consideration of this amendment and allowance of this case are respectfully requested.

Interview Summary Record

The Applicants thank Examiners Marks and Yuan for the courteous and helpful interview of May 3, 2010. The Examiners suggested further amendments to the claims to attempt to avoid the description and prior art rejections. However, they agreed to consider

possible structural differences produced by extrusion, punching and deep-drawing if these affect crystal or grain structure when performed within the temperature range required by the claims.. The description rejection with respect to limitation of indium content was reviewed and the Examiners agreed to provide a human translation of paragraphs 11-14 of Hikata to supplement the machine-translation of this reference.

Restriction/Lack of Unity/Election

The Applicants previously elected with traverse **Group I**, claims 1-3, directed to a method for making a battery. Claims 4-7, drawn to a battery, have been withdrawn from consideration. The requirement has been made FINAL.

The Applicants respectfully request that the claims of the nonelected group(s) or other withdrawn subject matter which depend from or otherwise include all the limitations of an allowed elected claim, be rejoined upon an indication of allowability for the elected claim, see MPEP 821.04.

Claims 8-13 were withdrawn from consideration as being directed to a non-elected invention, see the top of page 4 of the final OA. Claims 1-3 were deemed to have been constructively elected on the basis of their original presentation, see the paragraph spanning pages 3-4 of the final OA. The Applicants respectfully traverse the withdrawal of claims 8-13, especially in view of the amendments to claims 1 and 8 to recite the same bismuth content and temperature ranges. The methods of claims 1 and 8 do not encompass "mutually exclusive characteristics" as alleged on line 7 on page 3 of the OA, because both claims encompass methods of making anode zinc cans using the same process steps and the same or similar zinc alloy anode materials. While claim 8 expressly states that certain optional ingredients may be added to the zinc-bismuth anode material this does not render the zinc-bismuth alloy it recites mutually exclusive to that of claim 1. Accordingly, there would be no

additional burden in examining all of these claims together and rejoinder and examination of claims 8-13 is respectfully requested.

Rejection—35 U.S.C. §112, first paragraph

Claim 1 was rejected under 35 U.S.C. 112, first paragraph, as lacking adequate written description of the phrase "to which indium is not added" on the ground that page 5 (see the last few lines) of the specification states that indium is one of a group of elements that might be added. A claim term, such as "to which indium is not added" need not be literally described in the specification.

> The test for determining compliance with the written description requirement is whether the disclosure of the application as originally filed reasonably conveys to the artisan that the inventor had possession at that time of the later claimed subject matter, **rather than the presence or absence of literal support** in the specification for the claim language (emphasis added)", In re Kaslow, 217 USPQ 1089 (Fed. Cir. 1983).

Here, the bottom of page 5 makes clear that "at least one" element selected from the group of zirconium, strontium, barium, indium and aluminum may be added. When the "at least one element" is zirconium, strontium, barium or aluminum, then no indium is added. Moreover, contrary to the Examiner's position, there is no disclosure ***requiring*** the zinc-bismuth alloy to contain indium. Furthermore, zinc-bismuth alloys not containing indium are exemplified, for example, at the bottom of page 44 of the specification, clearly demonstrating that the Applicants possessed the concept of zinc-bismuth alloys not containing indium. Accordingly, this rejection cannot be sustained.

Rejection—35 U.S.C. §103(a)

Claims 1-3 were rejected under 35 U.S.C. §103(a) as being unpatentable over Batey, WO 00/77868, in view of Hikata, et al., JP 07-094193 and Kejha, et al., U.S. 2004/0018425.

Batey cannot render the invention obvious because it does not suggest a zinc anode material for forming a ***battery can***. Batey does not disclose processing an alloy pellet into a can, but is directed to producing a foil. The Batey foil is for use in an alkaline battery, includes 50 to 500 ppm bismuth, involves production of a less brittle foil that to be of practical use must be "capable of being bent or flexed through a small bend radius" (page 2, lines 26-27). However, Batey is silent about the properties of an anodic zinc alloy useful for making battery cans, such as those produced by extruding, punching and deep drawing, a process placing a large amount of strain or stress on the alloy. There was no reasonable expectation of success in Batey for an alloy having anti-cracking and anti-corrosion properties for making a battery can, especially by punching or deep drawing or for an anodic alloy not containing indium.

The two secondary references Hikata (English abstract) were applied to teach that "forming the negative electrode into an electrode can" is conventional (OA, page 5, 2nd paragraph) and that zinc alloys containing bismuth as well as alkaline earth metals (Mg, Ca, Sr or Ba) may be worked up at 180°C to 220°C to decrease cracking or chipping (OA, page 5, bottom of 2nd paragraph).

Hikata does not disclose the zinc alloy of the invention consisting of crystals from 8 to 25 μm of average grain diameter or an alloy which consists essentially of zinc and bismuth, or provide a reasonable expectation of success for use of such a zinc alloy for making a battery can with superior physical properties such as those shown in the comparative experimental data of record.

Moreover, the machine-translation of Hikata[1] paragraph [0013] while mentioning "a temperature of 180-220**" does not disclose pressing a Zn-Bi can at this temperature. Rather this temperature describes the temperature of a heating roller press that produces a 5-

[1] Human translation not yet available on PAIR.

mm-thick board, not a zinc can. The decreased chance of cracking or chipping mentioned by the Examiner on page 5, 2nd paragraph, of the OA refers to "an alloy plate at the time of rolling" and not to a Zn-Bi can. There is no suggestion in Hikata at all for producing a can by mechanical means at a temperature of 100-250 degrees C as required by the invention, nor any reasonable expectation of success for the average grain diameter of the alloy in such a can, or for the superior properties achieved by this selection.

Kejha was relied upon for teaching the process of extruding and deep-drawing (OA, page 3, lines 14, *ff.*), but does not disclose the other aspects of the invention, such as the importance of the type of Zn-Bi alloy and the processing temperature range.

None of the prior art discloses or suggests selecting the ***temperature range of 100 to 250 degrees C*** required by the present claims for making a Zn-Bi or Zn-Bi (no added indium) ***can*** of the invention. Manganese batteries are demanded because the offer better corrosion resistance that alkaline batteries. Bi is added as a corrosion resistant. The zinc alloy container of sheet that incorporates 1,000 to 7,000 ppm bismuth has a bad feature however. Excessive crystallization in Zn-Bi alloys including this amount of bismuth occurs at the conventional 250-350 degree C temperatures used to make cans or sheets and containers having a high degree of crystallization are brittle.

The difference in the amount of crystallization is clearly shown by comparing attached Fig. A and Fig. B. These photos of battery containers containing a lot of bismuth were taken by a metallurgical microscope. Fig. A (comparative) shows structural features of conventional Zn-Bi alloy cans processed at a higher temperature ranging from 250-350 degrees C, than those of the invention, shown in Fig. B. As evident from Fig. A, there are coarse particles having diameters of 500-1,000 μm, however, no such particles are seen in Fig. B. The coarse particles are supposed to be a cause of cracking. None of the prior art suggested selecting a processing temperature of 100 to 250 degrees C instead of a higher

conventional processing temperature. Moreover, even if prior art taught a ***zinc can*** processing temperature overlapping the subrange of that of the invention, the prior art provided no reasonable expectation of success for obtaining a superior, less brittle Zn-Bi can by selecting the required subrange.

Furthermore, with respect to the invention as it pertains to cans produced from Zn-Bi alloy with no added indium, the inventors have found that when In was added, ***low corrosion resistance*** resulted, see page 15 [0023].

> Whereas corrosion test by the conventional method for addition of indium to anode material by 0.1 percent by mass showed a level of corrosion resistance equivalent to that of the material with lead additive, a test this in invention, a practical and convenient method using a publicly available standard impurity additive, revealed a corrosion amount with the same material (indium 0.1 percent by mass) approximately 5 times as much as 21 mg/10cm2) with the material containing lead. The result meant a battery using the material indium 0.1 percent by mass added might involve practical problems, and in fact the battery made out with this material disclosed short battery life hardly useable, through evaluation test by repetition of discharge and halt. A preferable average crystal grain diameter of foregoing anode active material is less than or equal to 20 μm. An average crystal grain diameter more than or equal to 20 μm acts to lower corrosion resistance against electrolyte and increase corrosion amount to wear the can wall quickly. (emphasis added).

None of the prior art suggested or provided a reasonable expectation of success for the claimed methods of producing Zn-Bi cans having superior strength and corrosion resistance of the invention. Consequently, this rejection cannot be sustained.

Conclusion

This application presents allowable subject matter and the Examiner is respectfully requested to pass it to issue. The Examiner is kindly invited to contact the undersigned should a further discussion of the issues or claims be helpful.

Respectfully submitted,

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